3.4.6 Add New Science Algorithm Scenario

3.4.6.1 Scenario Description

This scenario describes the CM-related actions associated with integrating a new science algorithm with ECS software at a DAAC. (Note: DDTs-related screens are presented in section 3.4.7; XRP-II screens will be available after the COTS software has been received.)

3.4.6.2 Frequency

This scenario occurs once per DAAC in the release A time frame.

3.4.6.3 Assumptions

1. All key players (site data specialist, site CM administrator, SDPS/W developer, SSI&T staff, Production Planner) have access to ClearCase (the software configuration management tool). The site CM administrator, SDPS/W developer and SSI&T staff have access to DDTS (the change request management tool). The site CM administrator has access to XRP II (the baseline manager tool).
2. Responsibilities of key players (Ref: Maintenance and Operations Configuration Management Plan for the ECS Project, dated Sept. 95, Preliminary, 102-CD-002-001; Software Developer's Guide to Preparation, Delivery, Integration, and Test with ECS, 205-CD-002-002; Maintenance and Operations Manual for the ECS Project, dated Sept. 95, 607-CD-001-001):
   - Site Data Specialist—Provides DAAC point-of-contact/lead for planning, integrating, and testing, and operating science software.
   - Site CM Administrator—establishes and maintains CM records, facilitates the site's configuration change request process; monitors and reports status of proposed and approved CM actions; supports the CCB.
   - SDPS/W Developer—develops science software and delivers it to the DAACs; participates in the integration and test of the science software at the DAAC, in particular the evaluation of the results of integration and test; makes and/or authorizes making of corrections to the science software at the DAACs; maintains the science software in response to evolving ECS hardware and/or software environments.
   - SSI&T staff—performs algorithm integration and test at the DAACs with the support of the SDPS/W developer.
   - Production Planner—populates and maintains the Production Planning Database.
3. SCFs develop and maintain algorithms, including the tables and coefficients required by the SDPS/W. Changes can be made at the DAACs, but all changes will be provided to the SCFs.
4. SDPS subsystems archive algorithm files for processing by PDPS and for distribution to authorized users.

5. A PGE consists of one or more compiled binary executables and/or shell scripts. Each PGE will have a unique identifier assigned by the SDPS/W developer. At the DAAC, each PGE will receive a new version number when any component is changed (e.g., scripts, coefficient files, source code, or control files).

6. The benefits of CM of science software are to provide a definitive current "bill of materials" for the production software system at the DAAC and to maintain a record of previous versions of the science software system and test configurations. For any product generated at any given time, the exact configuration of science software, coefficient files, scripts, documentation, etc. is known and can be reconstructed.

7. Configuring processing resources into strings is a resource management, not configuration management, function.

8. Populating planning and processing subsystem databases with information needed to run the science software operationally is not a configuration management function. However, the information is configuration controlled.

9. SDPS/W, documentation, and coefficient files will be placed under CM at the DAAC when a delivery is made.

10. The DAAC will baseline only the launch-ready versions of the SDPS/W for long-term CM. Earlier deliveries (beta and engineering versions) will be placed under CM only for the duration of the integration and testing effort.

11. A ClearCase software library exists at the DAAC and is used to version control science software files containing code, scripts, makefiles, calibration coefficients, and control parameters.

12. A delivery package containing the science software files has been delivered to the DAAC. The package contains an entire, "Operational, Launch-Ready" version of the SDPS/W system and supporting documentation to include development test results and test data.

13. This is a new algorithm.

14. Algorithm developers and testers want to use DDTS to record and track bugs identified during SSI&T. Algorithm bug records are AI&T records that will be stored separate from ECS CCR records.

3.4.6.4 Components

Figure 3.4.6.4-1 indicates the interaction between the DAAC personnel and the ECS subsystems.

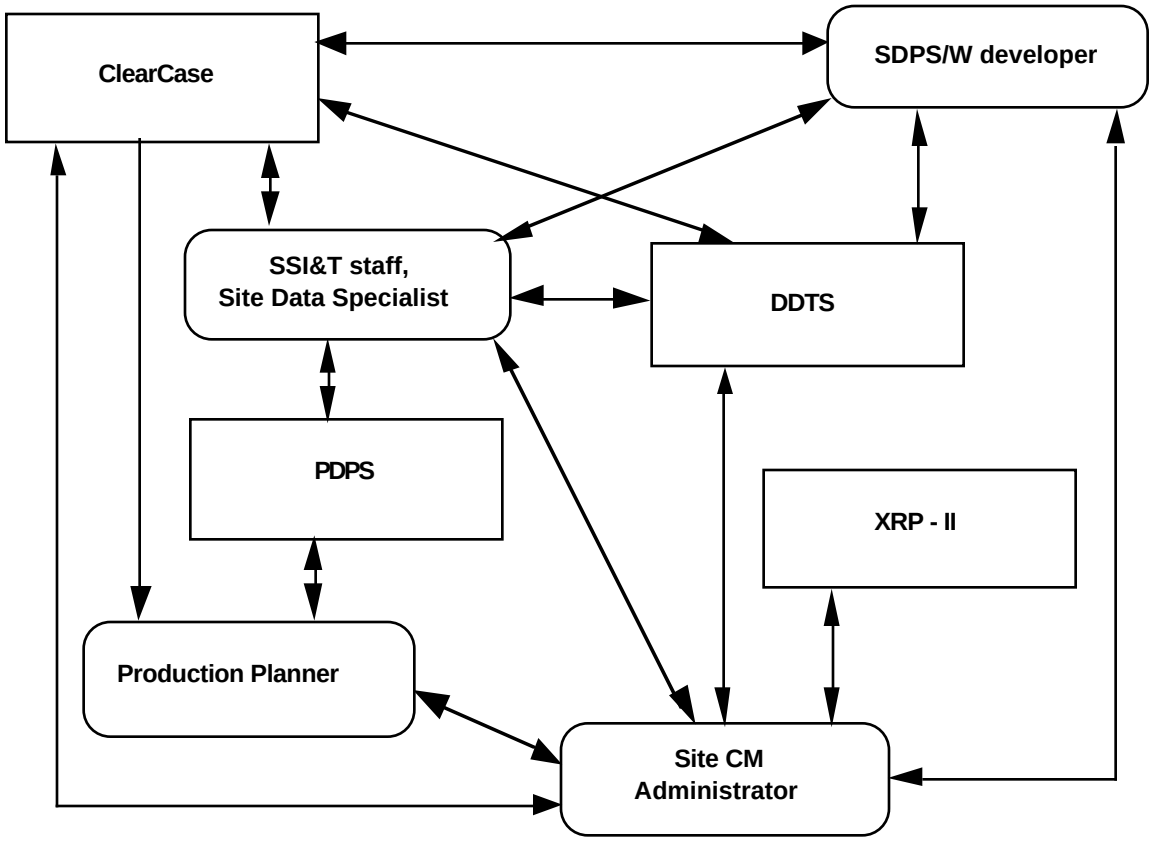

Figure 3.4.6.4-1. Add New Science Algorithm Scenario Components

3.4.6.5 Preconditions

SDP Toolkit software (both mandatory and optional tools) exists in the site software library.

Delivery package containing files to be stored and controlled have been received at the DAAC and are ready to be loaded into ClearCase. Documentation, including development test results, have also been received at the DAAC.

An approved CCR exists in the DDTS database to create a maintenance work area in the software library for this SSI&T campaign.

Hardware and networks needed to support the SSI&T environment exist at the DAAC.

3.4.6.6 Detailed Steps of Process

Table 3.4.6.6-1 represents the details of this scenario. The times and duration given are approximate.

Table 3.4.6.6-1. Add New Science Algorithm Process (1 of 6)

Step	Time (mins)	User	Science Operator (SDPS/W developer, Data Specialist, SSI&T staff, Production Planner)	ECS System	Figure
1	30		In response to an approved CCR, CM administrator prepares an SSI&T work area in the software library for the algorithm. CM administrator uses the ClearCase "admin" menu, providing the name of the algorithm and an estimate of its size and specifying the location for the work area.	ClearCase configures an SSI&T storage area for the specified algorithm and sets max and reclaim size parameters needed for periodic database scrubbing.	3.4.6.6-1
2	5		CM administrator uses the ClearCase "view" menu to create a default view from which the algorithm files can be accessed.	ClearCase registers the view definition.	3.4.6.6-2
3	15		SDPS/W developer notifies the DAAC's Data Specialist and CM administrator via e-mail that a set of files comprising the algorithm has arrived at the DAAC and is ready for loading into the SSI&T work area of the library. The name of the algorithm, the name(s) and structure of the files to be loaded into ClearCase, and the format of the files (i.e., MVFS, archive, UNIX, etc.) are included in the message.	E-mail facility delivers and displays the message.	
4	30		The CM administrator uses ClearCase's file conversion scripts to load the algorithm files to be stored.	ClearCase creates sub-directories, files, and branches in the work area for the new algorithm; loads the algorithm files; attaches ClearCase metadata, assigning default values; sets default access privileges; and logs all library change events.	

Step	Time (mins)	User	Science Operator (SDPS/W developer, Data Specialist, SSI&T staff, Production Planner)	ECS System	Figure
5	<5 each build (system may take hours to do builds depending on the size and complexity of the algorithm)		SDPS/W developers begin the stand-alone portion of SSI&T. They use ClearCase's "Building" menu to "make" executables with the SCF version then the DAAC version of the SDP Toolkit according to DAAC-IT agreements and SSI&T procedures. For each build, the member specifies the makefile to use, the target(s) to build, and any clearmake options desired in response to ClearCase prompts.	ClearCase controls the builds, tracking derived objects and creating build records which ClearCase saves for re-creating the builds. Library change events are logged.	3.4.6.6-3 3.4.6.6-4
6	5		SDPS/W developers list the contents of the build to confirm the build ran as intended. They use ClearCase's "Building" menu, selecting "Display config rec" then "Recursive (long)". They enter the name of the newly built target when prompted by ClearCase.	ClearCase generates the requested list.	3.4.6.6-5
7	<10		Stand-alone testing reveals that minor software changes are needed. SDPS/W developers use DDTS to compose and save a bug report.	DDTS stores the bug report and notifies designated personnel.	
8	3		SDPS/W developers use ClearCase's "view" menu and/or view-tag browser to locate the latest file versions, then use the file browser to select the files they want to modify. They use the checkout tool on the toolbar to obtain writable copies, supplying the bug number and a checkout comment when prompted by ClearCase.	ClearCase lists available views, then creates a private work area for the view selected. After a successful check with DDTS to verify the bug report exists, ClearCase makes the named file version(s) available for modification and sets its checkoutStatus flag to preclude unintended concurrent changes.	3.4.6.6-2 3.4.6.6-6 3.4.6.6-7

Step	Time (mins)	User	Science Operator (SDPS/W developer, Data Specialist, SSI&T staff, Production Planner)	ECS System	Figure
9	3		After SDPS/W developers have used available software maintenance tools to modify, compile, and verify checked out files, they use the "checkin" tool on ClearCase's toolbar to save the changes in the library, entering the bug number and a checkin comment when prompted.	ClearCase interacts with DDTS to verify that the bug report exists and has been approved for implementation. ClearCase then checks in the changes on a "maintenance" branch in the library, records the bug number and comments, and sets the promotion Level attribute of changed files to "maintenance". Library change events are logged.	
10	5 (system may take hours to do builds de-pending on the size and com-plexity of the algorithm)		SDPS/W developers initiate new builds in order to complete stand-alone testing.	ClearCase controls the builds, tracking derived objects and creating build records which ClearCase saves for re-creating the builds, and successfully.	3.4.6.6-3
11	5		After successful stand-alone testing, SDPS/W developers run the "software ready" script to mark the versions of files that are ready for integrating with the production system for DAAC testing.	ClearCase assigns version labels to the files and sets their state attributes to "ready for integration testing". Library change events are logged.	
12	<10		The Data Specialist uses DDTS to compose and submit a CCR, requesting that the algorithm be uploaded to the SDPS Data Server and that the Planning databases be populated.	DDTS stores the CCR and notifies designated personnel.	

Step	Time (mins)	User	Science Operator (SDPS/W developer, Data Specialist, SSI&T staff, Production Planner)	ECS System	Figure
13	10		After inspection of the delivery by the DAAC and upon CCB approval, the CM administrator brings the file versions under DAAC control, executing the ClearCase "impound software" script. CM administrator defines a view for the "as received" files.	ClearCase sets the promotionLevel attribute to "received by DAAC" for each file version marked as ready for integration testing after first checking that the user ID is authorized to promote the software to this lifecycle stage. ClearCase registers the specifications for the new view.	3.4.6.6-2
14	5 (system may take hours to do builds de-pending on the size and com-plexity of the algorithm).		CM administrator initiates builds of the PGEs and associated scripts that are needed by the Data Server by using the algorithm makefiles.	ClearCase again controls the builds, tracking derived objects and creating build records which it saves for re-creating the builds.	3.4.6.6-3 3.4.6.6-4
15	5		CM administrator assigns a name and DAAC (vice SCF) version number to the files associated with each PGE using ClearCase's "Metadata" menu.	For all file versions used in building a PGE, ClearCase attaches the specified PGE version label. Library change events are logged.	3.4.6.6-8
16	10		CM administrator notifies the Data Specialist, SSI&T members, and Production Planner via e-mail that the algorithm is ready to be loaded in SDPS for acceptance testing.	E-mail facility sends and displays the message.	

Step	Time (mins)	User	Science Operator (SDPS/W developer, Data Specialist, SSI&T staff, Production Planner)	ECS System	Figure
17	One day (depends on number and complexity of PGEs)		Data Specialist and/or SSI&T members follow install procedures to upload the algorithm files to the Data Server. Production Planner follows install procedures to populate Planning databases. They notify the CM administrator via e-mail when done.	ClearCase makes the files available for copying. E-mail facility sends and displays message.	
18	5		CM Administrator executes DDTS to close the CCR.	DDTS records the change in CCR status and notifies designated personnel.	
19	5		SSI&T members run the "software ready" script to mark versions of files as integration testing is completed, and the CM administrator runs the "impound script" to impound them from SSI&T members pending acceptance review.	ClearCase sets state attributes to "ready for acceptance". The "impound script" has ClearCase set the state attributes to "impounded for acceptance" and promotionLevel attributes to "delivered from SSI&T" after first checking that the user is authorized to promote the software to this lifecycle stage.	
20	<10		Upon acceptance of the algorithm by the DAAC, the CM administrator executes DDTS to submit a CCR to baseline the accepted files and delete the SSI&T's library work area.	DDTS stores the CCR and notifies designated personnel.	
21	5		Upon CCR approval, the CM administrator invokes the "impound software" script to freeze the algorithm files in an area of the library reserved for production software. The files are locked and labeled such that the algorithm version can be re-built in the future.	ClearCase places the versions on their respective production branches in the library. ClearCase sets their state attributes to "in commissioning" and promotionLevel attributes to "production".	

Step	Time (mins)	User	Science Operator (SDPS/W developer, Data Specialist, SSI&T staff, Production Planner)	ECS System	Figure
22	5		CM administrator uses ClearCase's "view" menu to create a production view for the delivered algorithm files. The view offers read privileges for SDPS/W developers so they can copy the files and forward them to the SCF.	ClearCase registers the specifications for the new view.	3.4.6.6-2
23	5		CM administrator uses ClearCase's "admin" menu to delete the algorithm's SSI&T work area.	ClearCase removes the SSI&T storage pool from the library.	3.4.6.6-1 3.4.6.6-9
24	30		The CM administrator uses XRP II to create and relate resource and document identity profiles for the baselined algorithm. CM administrator selects specific product information menus to enter the CCR # and record such data as algorithm, PGE, and document names and version identifiers, and effectivity data associated with the baseline change.	XRP II creates new resource and document records in the baseline management database from information entered on part master maintenance data entry screens. XRP II maintains product structure records in the database from information entered on engineering change maintenance and product structure maintenance screens. XRP II obtains certain attributes from ClearCase; the remainder are obtained from the CM administrator.	
25	2		The CM administrator uses DDTS to close the CCR.	DDTS updates the CCR status and informs designated personnel that the status has changed.	
26	20		Upon completion of algorithm commissioning, the CM administrator updates the algorithm status in ClearCase and XRP II.	ClearCase changes the state attribute of the algorithm files to "full production". XRP II updates the status of algorithm resource and document records to "full production".	3.4.6.6-10

3.4.6.7 Postconditions

Algorithm files are frozen and labeled in a production area of the software library.

The set of algorithm files accepted by the DAAC can be accessed by SDPS/W developers so a copy can be provided to the SCF.

CCRs associated with the SSI&T are closed.

The SSI&T work area in the library is removed.

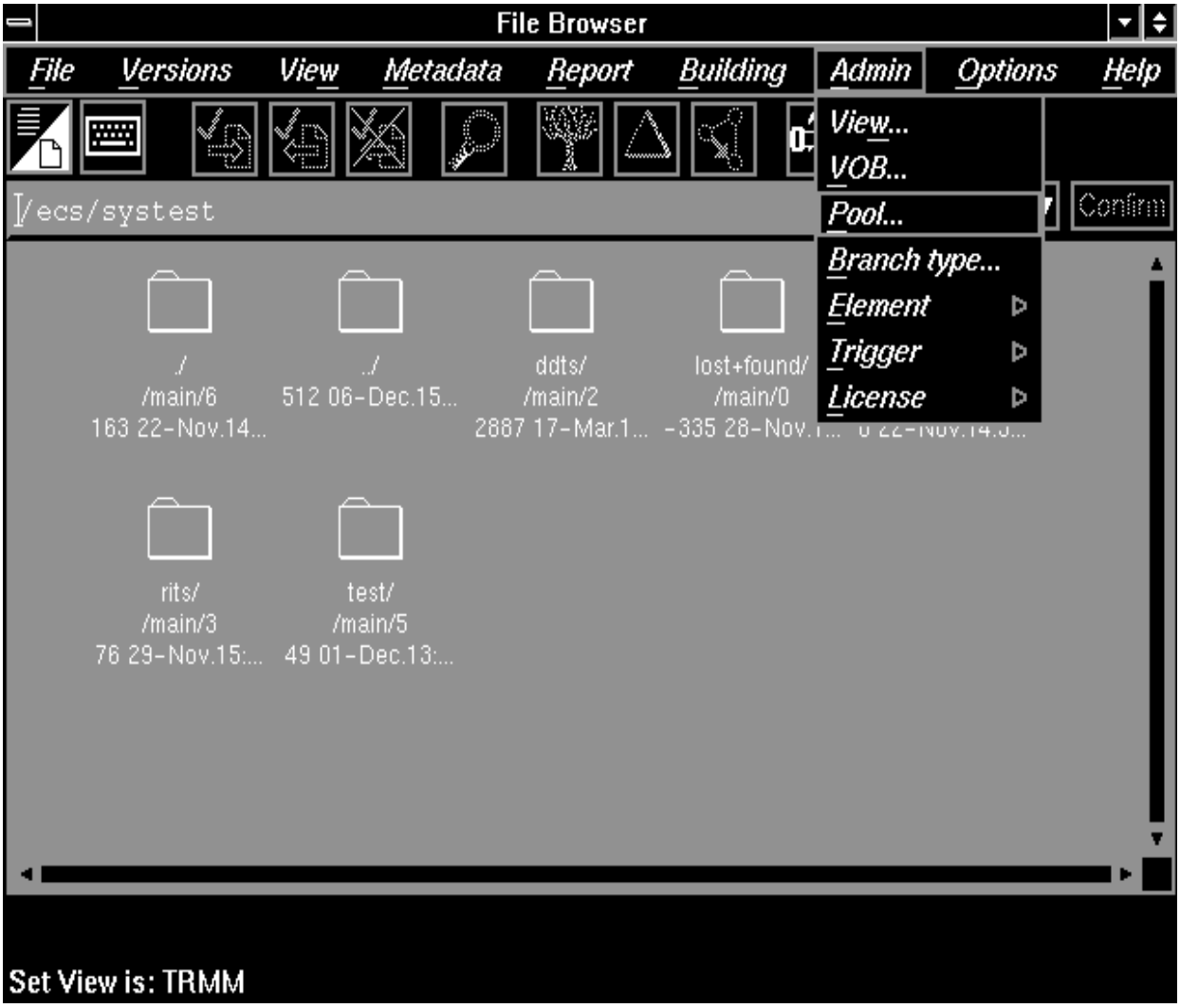

Figure 3.4.6.6-1. ClearCase Administration

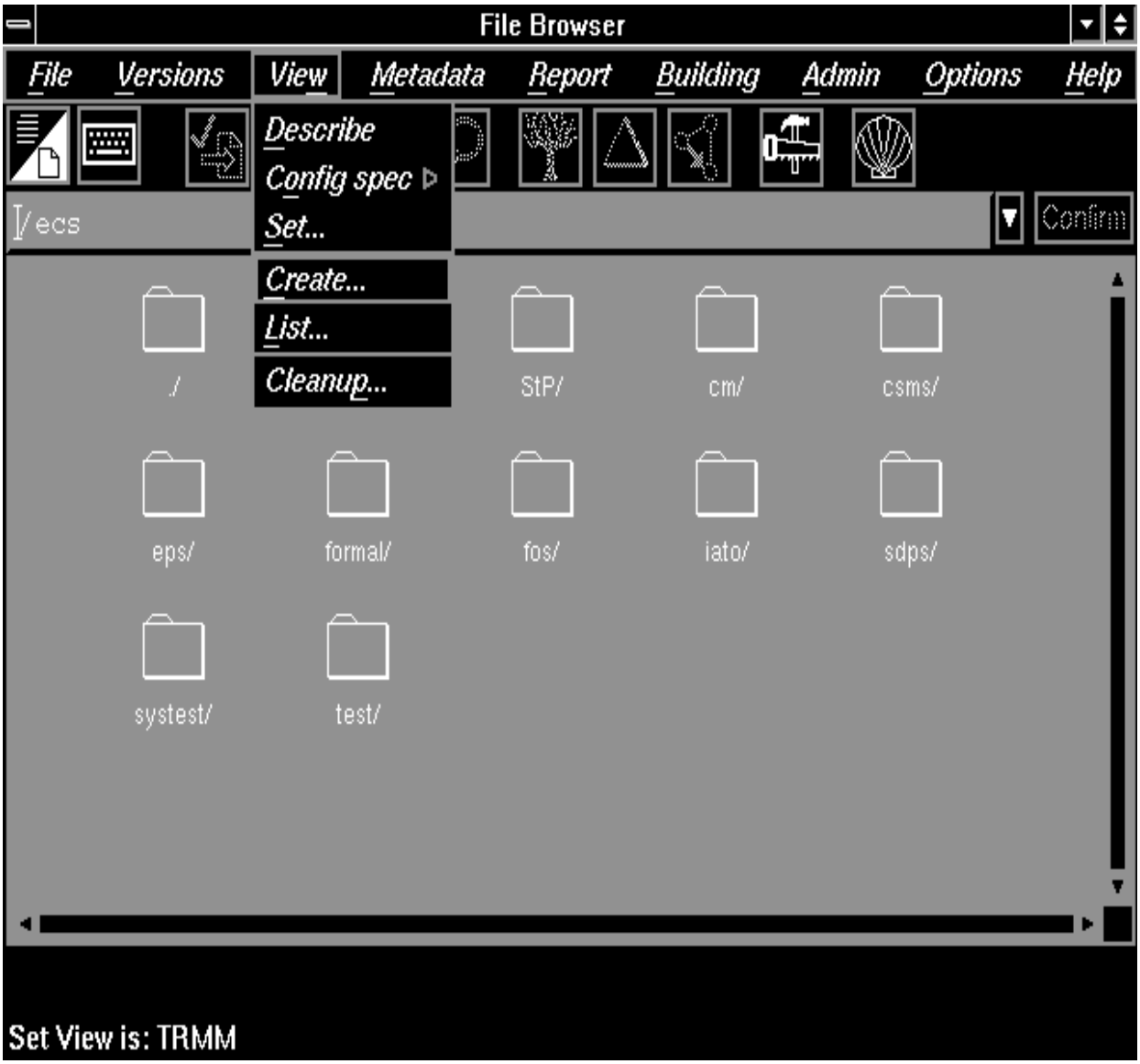

Figure 3.4.6.6-2. Working with ClearCase Views

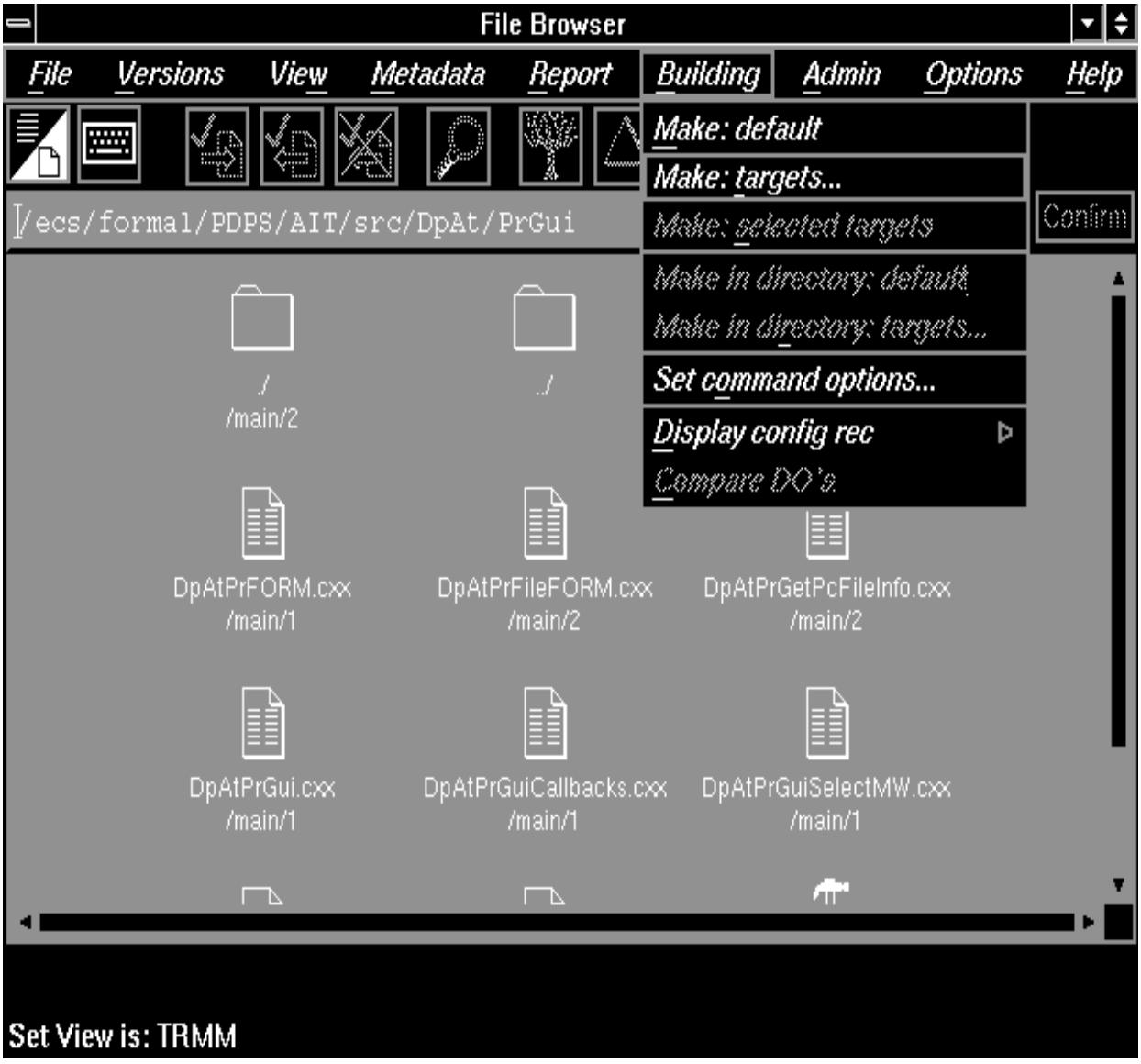

Figure 3.4.6.6-3. Initiating ClearCase Builds

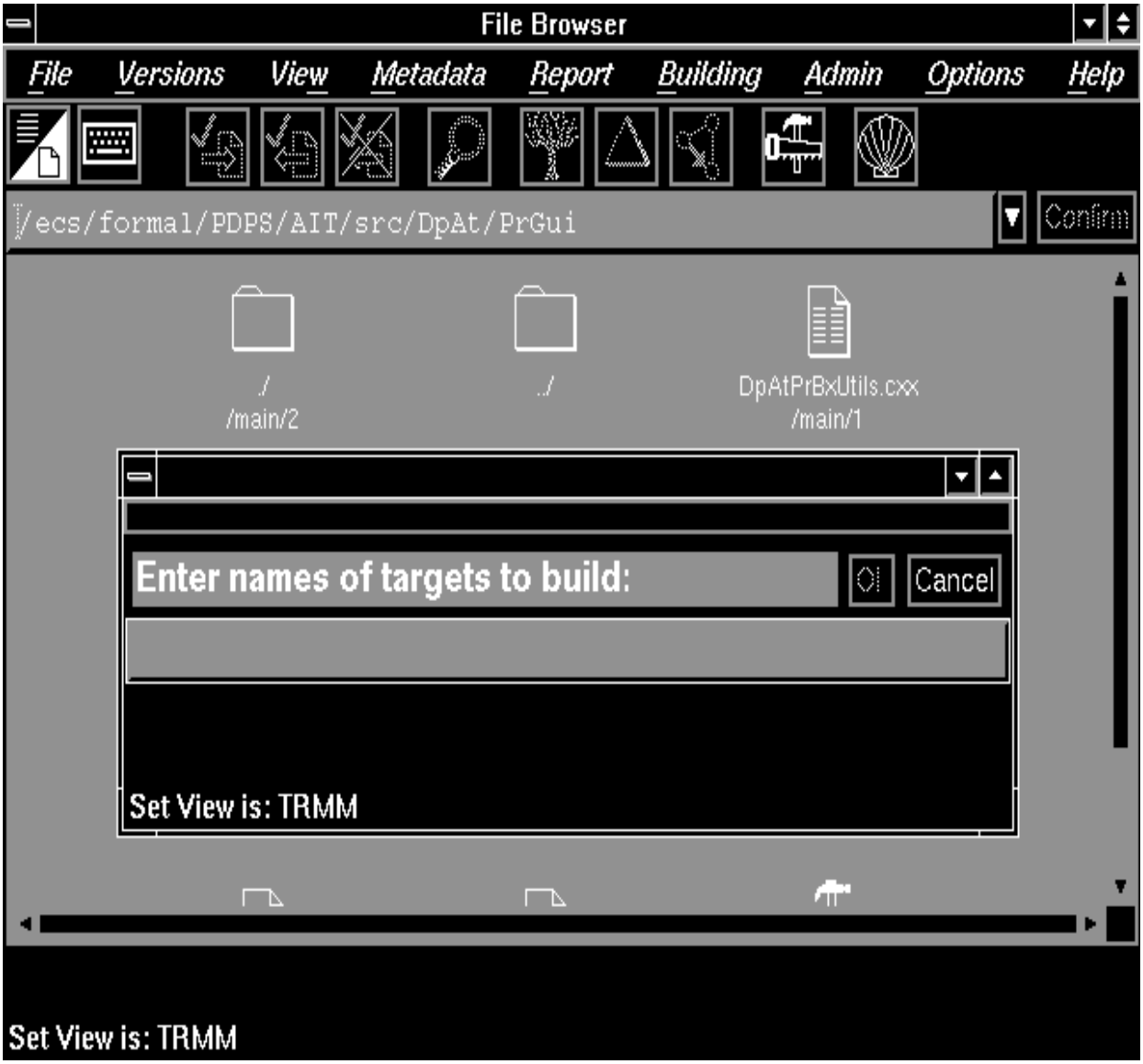

Figure 3.4.6.6-4. ClearCase Dialogue Box

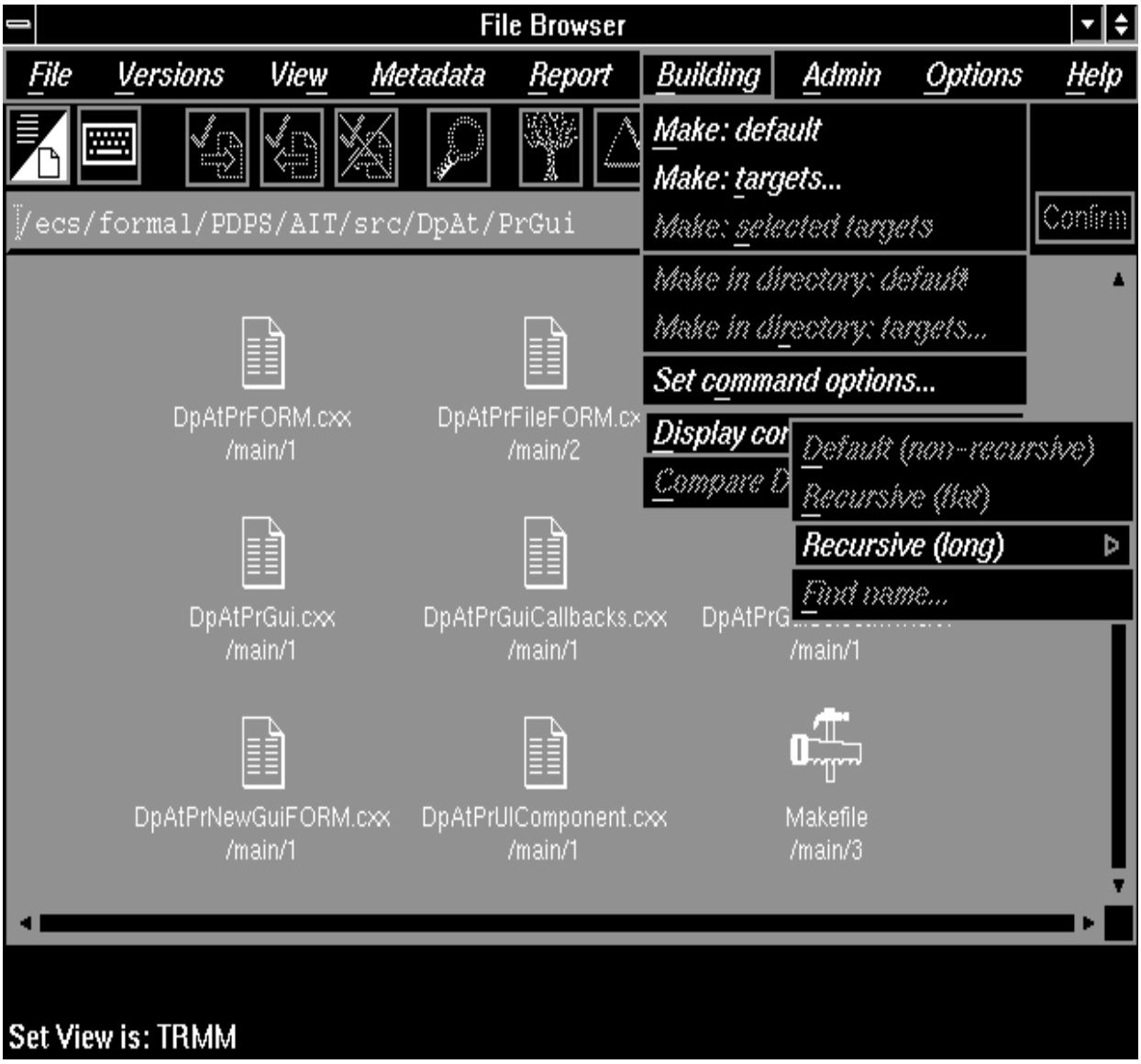

Figure 3.4.6.6-5. Listing Contents of ClearCase Builds

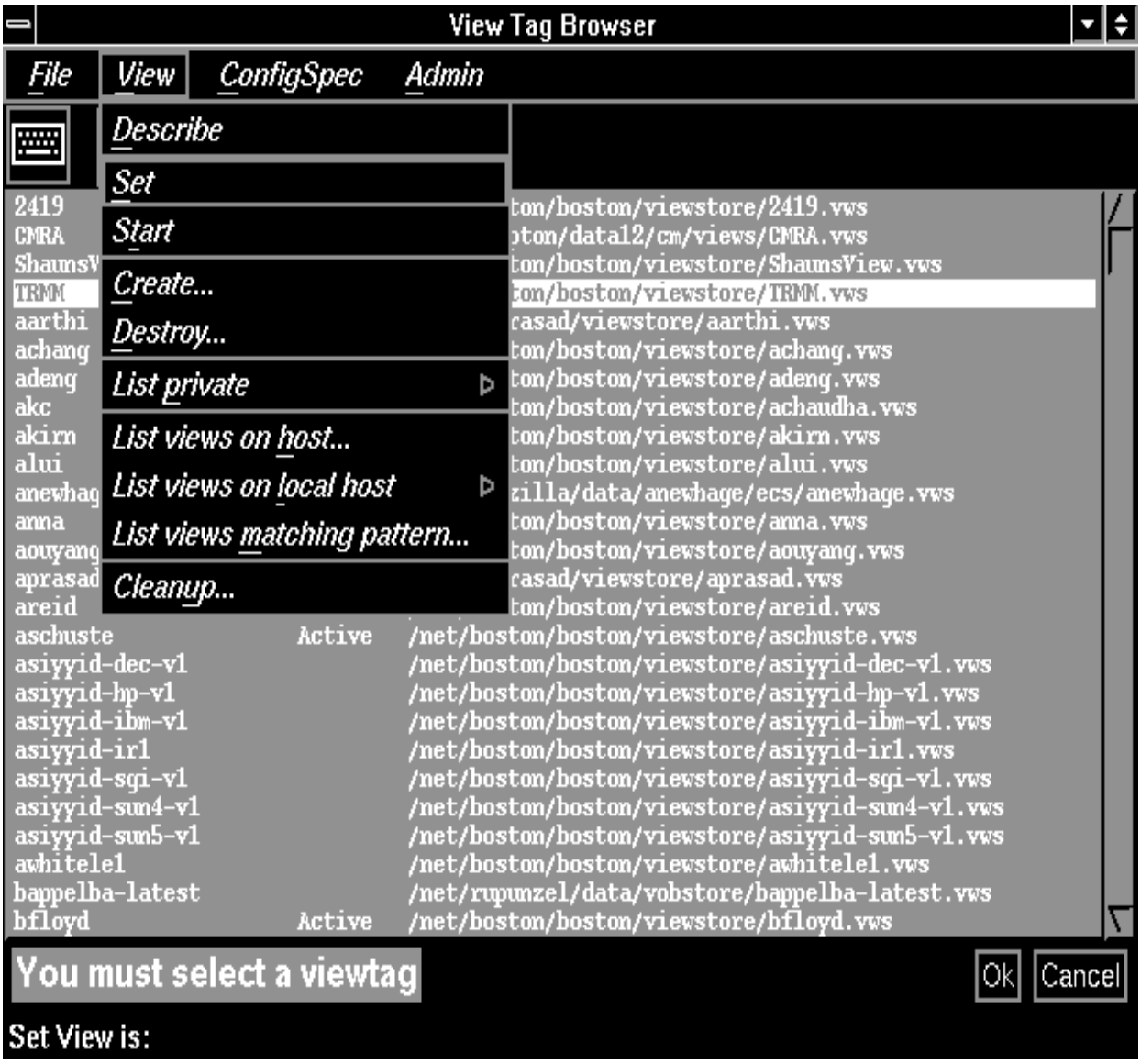

Figure 3.4.6.6-6. ClearCase View Browser

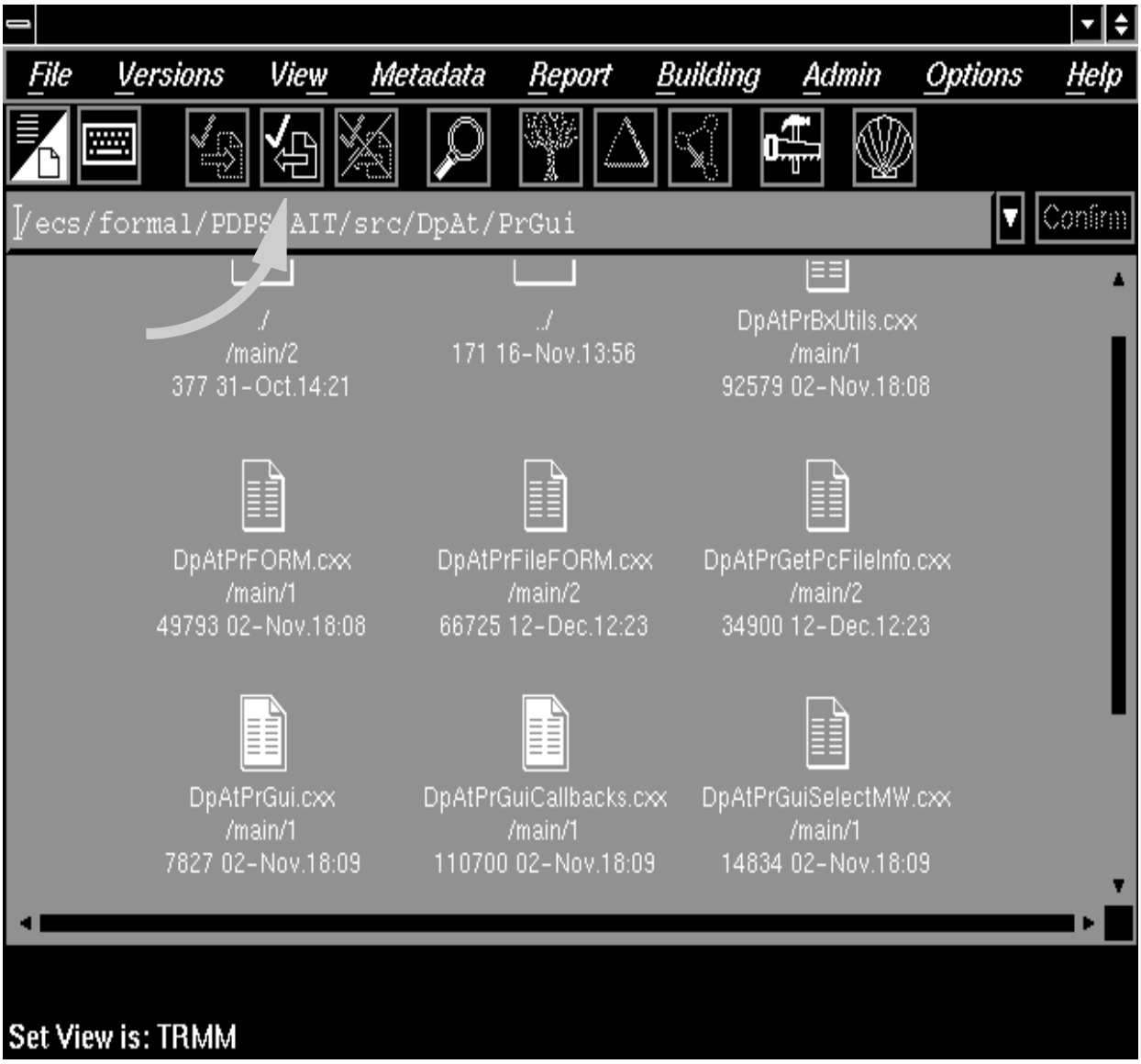

Figure 3.4.6.6-7. Using the Toolbar to Check Out ClearCase Files

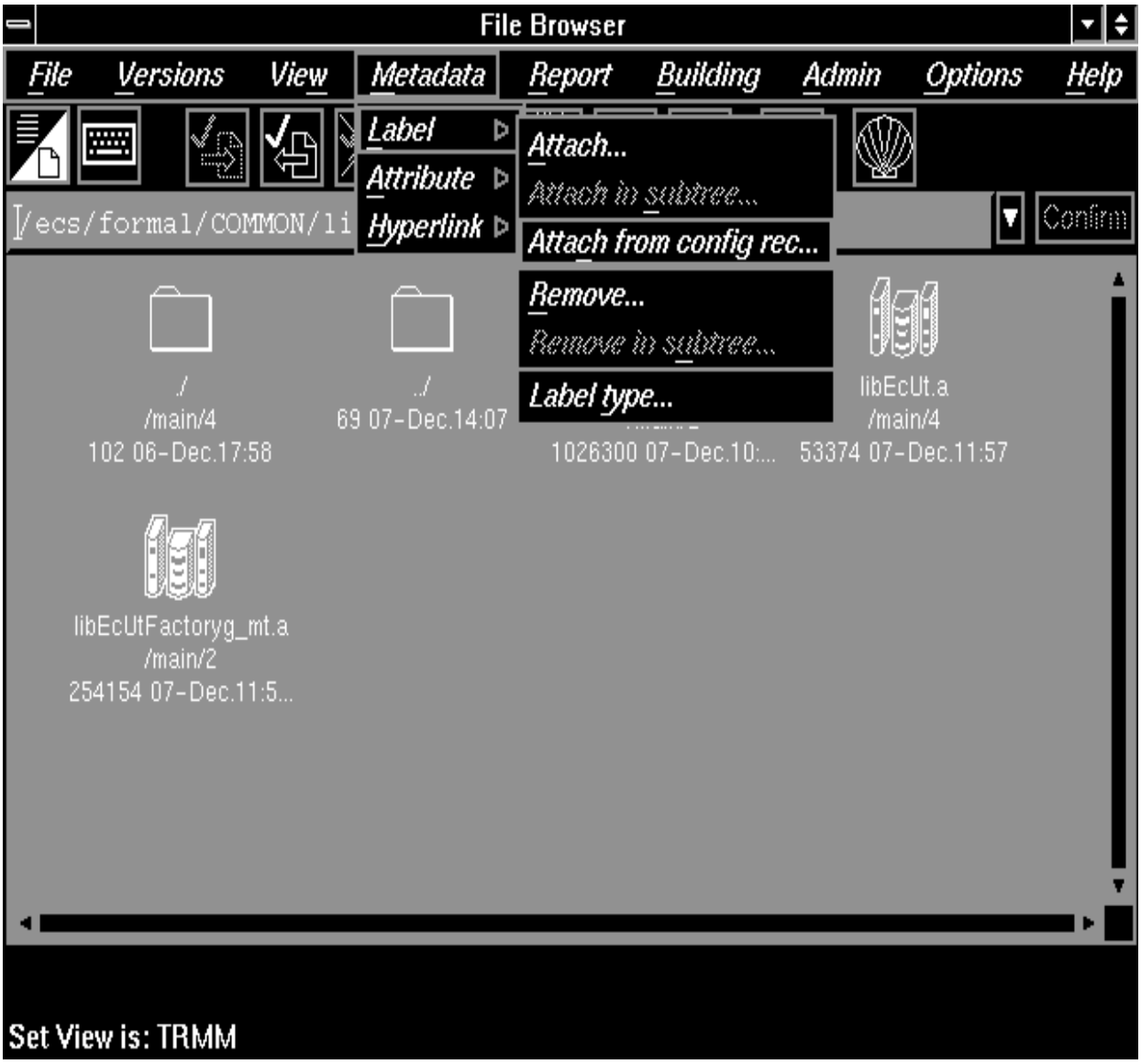

Figure 3.4.6.6-8. Labeling ClearCase Files

Figure 3.4.6.6-9. Maintaining ClearCase Physical Storage

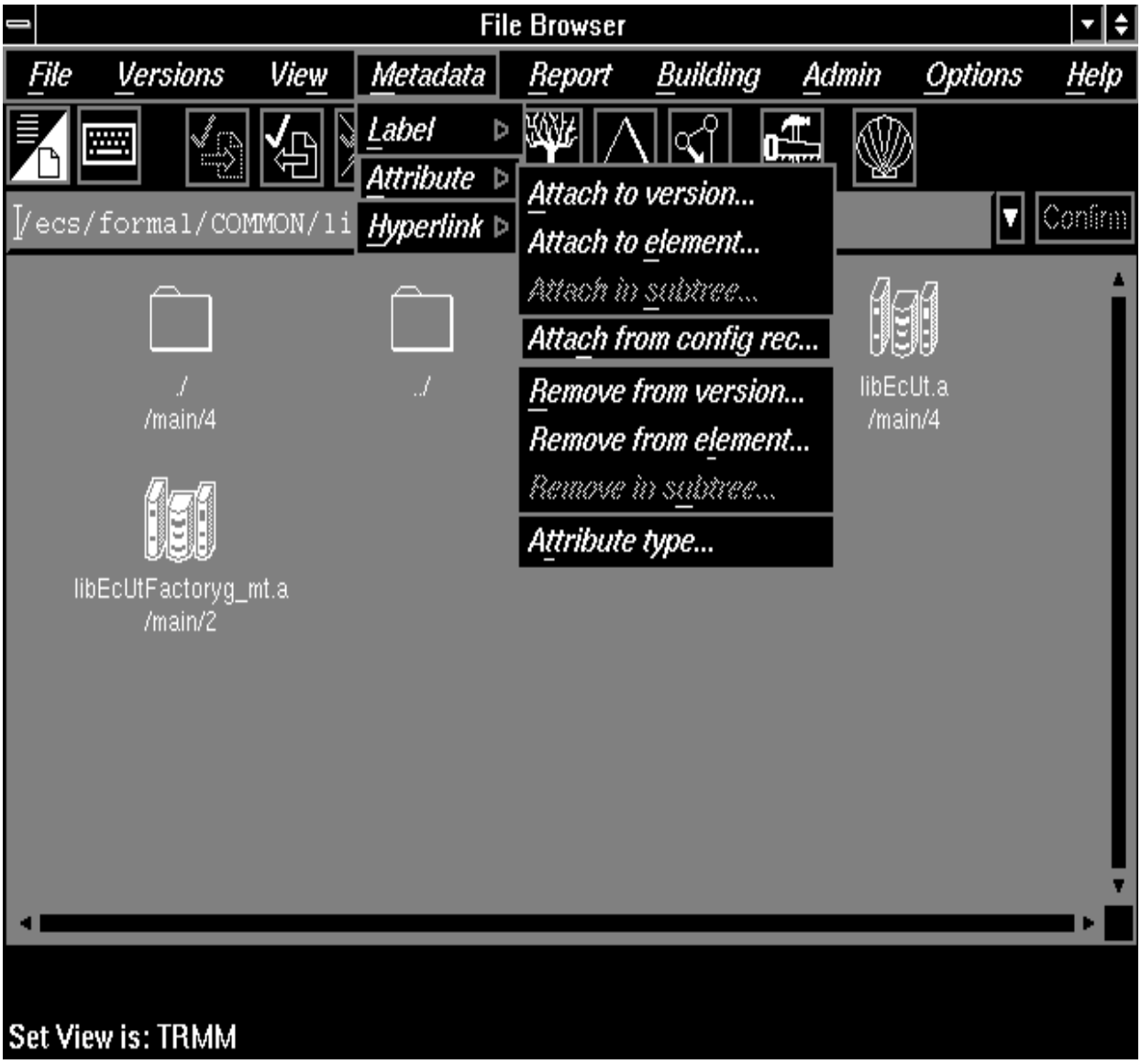

Figure 3.4.6.6-10. Changing ClearCase File Attribute Values